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<b>(21) International Application Number:</b> PCT/IL99/00499 <b>(22) International Filing Date:</b> 14 September 1999 (14.09.99) <b>(30) Priority Data:</b> 126246 16 September 1998 (16.09.98) IL <b>(71) Applicant (for all designated States except US):</b> SAFETY QUICK LIGHT LTD. [IL/IL]; Sheshet Hayamim Street 28, 51202 Bnei Brak (IL). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> KOHEN, Ran [IL/IL]; Ramot Yam Street 50, 46851 Herzlia (IL). <b>(74) Agent:</b> EITAN, PEARL, LATZER & COHEN-ZEDEK; 2 Gav Yam Center, Shenkar Street 7, 46725 Herzlia (IL).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i>
<b>(54) Title:</b> A PLUG AND SOCKET COMBINATION  <div data-bbox="406 1071 1234 1617"> </div>		
<b>(57) Abstract</b>  <p>The invention relates to a socket and plug combination for conducting electric power and for mechanically supporting an appliance. The combination comprising: a) a socket rigidly attachable to a wall or ceiling, the socket including at least two spaced-apart hollow receptacles connectable to an electric power supply, the socket also comprising a mechanical connection first element; b) a plug rigidly attachable to and configured to mechanically support an appliance, the plug supporting at least two projecting prongs engageable with the two hollow receptacles and connectable to conductors for feeding electric power to the appliance; c) releasable latching means attached to the combination providing the retention force between the socket and the plug to support the appliance.</p>		

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## A PLUG AND SOCKET COMBINATION

The present invention relates to wall or ceiling connection and support  
10 for light electric appliances.

More particularly, the invention provides a plug and socket combination  
suitable for residential use which provides both electrical and mechanical  
connection so that appliances such as lights and fans can be quickly and easily  
installed or exchanged.

15 New buildings are often handed over to their tenants with ceiling lights  
comprising an incandescent filament lamp and bulbholder suspended by a pair  
of insulated electric wires. Whether the building is for commercial or residential  
use, better light fittings need to be installed. Installing a luminaire requires  
drilling the ceiling, inserting screw bushes, disconnecting the installed  
20 bulbholder, electrically connecting the luminaire and mechanically attaching  
same to the ceiling. According to the law in Israel and some other countries,  
only a licensed electrician may carry out such work.

In commercial buildings where large numbers of ceiling lights are  
installed in a single hall, and appearance is of only secondary importance,  
25 multiple lights can be mounted along a single rail, for example the DIN-EN  
50.022 rail for quick mechanical attachment. Electrical connections need  
separate installation, which can be supplied for example by plugging into a  
surface raceway containing electric feed cables. In industrial buildings where  
adaptability to changing requirements outweighs visual considerations, busway  
30 systems are used where interconnected prefabricated lengths of steel or  
aluminium duct enclose bus bars carried on insulators. The Klockner-Moeller

company markets a busbar trunking system for industrial lighting under which fluorescent light fittings can be clipped. The system includes tap-off plugs provided with 1 meter of connector cable.

However in residential and some other buildings a situation prevails  
5 where good appearance is demanded, the number of light fittings in one row rarely exceeds three and frequent changes are not carried out. Nilssen in US Patent no. 4,631,648 proposes a master power track which can be used in combination with, and to support a suspended ceiling to provide a standard of appearance acceptable in residential buildings. However his system is  
10 inapplicable where no such ceiling is used, and cannot be economically justified where only one or two lights need to be installed.

In US Patent No. 5,250, 874 Hall et al. disclose a plug-in lamp provided with spring side contacts which serve to retain the lamp in a socket as well as supplying electric power to the lamp. Such arrangement is no doubt satisfactory  
15 where only the lamp, weighing about 100 gram is to be suspended. A complete luminaire however may however weigh several kilograms and would not be securely held only by spring contacts.

It is therefore one of the objects of the present invention to obviate the disadvantages of prior art connection methods and to provide a combined  
20 electrical and mechanical connector configuration which allows a light electric appliance such as a fan or light to be removed or plugged in securely in about the same time as is presently required for changing a light bulb.

It is a further object of the present invention to make such plugging in legally allowable by any person.

25 The present invention achieves the above objects by providing a socket and plug combination for conducting electric power and for mechanically supporting an appliance receiving said power, said combination comprising:

a) a socket rigidly attachable to a wall or ceiling, said socket including at least two spaced-apart hollow receptacles connectable to an electric power  
30 supply, said socket also comprising a mechanical connection first element;

b) a plug rigidly attachable to and configured to mechanically support an appliance, said plug supporting at least two projecting prongs engageable with said two hollow receptacles and connectable to conductors for feeding electric power to said appliance, and said plug also comprising a mechanical  
5 connection second element engageable with said first element; and

c) releasable latching means attached to said combination providing the retention force between said socket and said plug to support said appliance.

In a preferred embodiment of the present invention there is provided a socket and plug combination wherein said mechanical connection first element  
10 comprises a rim of said socket, said mechanical connection second element comprises a rim of said plug, and said releasable latching means comprises a releasable catch tongue springing into engagement when the said plug is pushed into said socket.

In a most preferred embodiment of the present invention there is  
15 provided the socket and plug combination wherein the mechanical connection first element comprises an additional receptacle and the mechanical connection second element comprises an additional prong engageable with said additional receptacle.

Yet further embodiments of the invention will be described hereinafter.

20 It will thus be realized that the novel device of the present invention serves to meet a standard of outer appearance acceptable in residential areas together with the fast install and remove facility expected in industrial environments.

Anchoring means provided for the socket of the present invention are  
25 stronger than those used in many conventional sockets, which tend to separate from the wall during unplugging of the appliance. The socket can be cemented in, attached by several screws or other anchoring devices. However the friction claws engaging the inner surface of a cylindrical hollow into which conventional sockets are inserted are not considered to have adequate holding power for the  
30 present application.

While the primary application of the present invention is expected to be in conjunction with lighting fittings, further light/electrical appliances such as small fans, radios, emergency lights, illuminated signs and the like can also be fast installed and removed by use of the present invention.

5       The invention will now be described further with reference to the accompanying drawings, which represent by example preferred embodiments of the invention. Structural details are shown only as far as necessary for a fundamental understanding thereof. The described examples, together with the drawings, will make apparent to those skilled in the art how further forms of the  
10       invention may be realized.

In the drawings:

FIG. 1 is a sectional elevational view of a preferred embodiment of the plug-socket combination according to the invention;

15       FIG. 2 is a sectional elevational view of an embodiment provided with an additional prong and receptacle for mechanical support;

FIG. 3 is a sectional elevational view of an embodiment secured by a transverse safety pin;

20       FIG. 4 is a detail view of an embodiment secured by a pawl and ratchet tooth; and

FIG. 5 is an elevational view of an embodiment mounted to support a wall lamp.

25       There is seen in FIG. 1 a socket and plug combination 10 for conducting electric power and for mechanically supporting an appliance 12 such as a small fan, a light or radio receiving such power.

A socket 14 is rigidly attached to a ceiling 16, and is firmly anchored thereto with sufficient strength to support the appliance 12. Examples of suitable anchoring will be shown in FIGS. 3 & 4.

The socket 14 includes two spaced-apart hollow receptacles 18 connectable to an electric power supply. A non-electrical receptacle (not shown) is added if necessary to suit the plug 20 to be inserted.

Advantageously the geometrical size, shape and formation of the two  
5 hollow receptacles 18 conforms to that of an existing standard electric socket.

A mechanical connection first element 22 is part of the socket 14. In the present embodiment the mechanical connection first element 22 comprises a rim of the socket housing 24, which has a ledge 26 configured to engage the plug 20.

10 The plug 20 is rigidly attached to and configured to mechanically support an electric appliance 12. The plug 20 also supports two projecting prongs 28 engageable with the two hollow receptacles 18. The prongs 28 are connected to conductors 30 for feeding electric power to the appliance 12.

An additional non-electric prong (not shown) is added if the configuration  
15 is such that without such additional non-electric prong it would be possible to insert the plug 20 into the socket 14 in any but the correct manner.

The plug is provided with a mechanical connection second element 32 engageable with first element 22. In the shown embodiment, such mechanical connection second element comprises a rim of the plug 20. The rim shown  
20 extends 180 degrees around the plug 20, and is engageable with the first element 22.

Releasable latching means are positioned opposite the rim. The latch comprises a releasable catch tongue 34 springing into engagement when the plug 20 is pushed into the socket 14. The tongue 34 can be gripped by  
25 extension 36 for purpose of releasing the plug 20 from the socket 14. The releasable catch tongue 34 provides at least some of the retention force between socket 14 and plug 20 to support appliance 12.

Preferably the latching means are sized to engage with sufficient retention force to support a two kg appliance in a ceiling socket during an  
30 earthquake not causing structural damage to the building in which the combination 10 is installed.

With reference to the rest of the figures, similar reference numerals have been used to identify similar parts.

Referring now to FIG. 2, there is seen a socket and plug combination 38 wherein the mechanical connection first element comprises an additional receptacle 40 in the socket 42. The mechanical connection second element comprises an additional prong 44 in the plug 46 engageable with additional receptacle 40. Plug 46 supports a fan 47.

In the present embodiment releasable latching means is a captive spring-loaded ball detent 48.

10 When the plug is fully inserted, the ball 50 engages a recess 52 in the receptacle 54. This embodiment requires no special release mechanism. Extraction of the plug 46 is effected by exceeding the detent holding force.

FIG. 3 illustrates an embodiment where the releasable latching means is a safety pin 56. The pin 56 in the present embodiment is guided in the plug 58, passes through the enters the mechanical connection second element comprising the additional prong 60 engageable with additional receptacle 62. The pin 56 provides maximum security against unintended release.

The pin 56 is partially extracted from the side to unplug the appliance, a fluorescent light 61.

20 Advantageously the additional prong 60 and additional receptacle 62 are metallic and are arranged to be wired for use as an earth connection.

Anchoring is reinforced by using rigid conduit tubes 64 connected to the socket housing 66.

Seen in FIG. 4 is an enlarged detail of a socket and plug combination 68 wherein the releasable latching means is a ratchet tooth 70 and pawl 72. The latching means is releasable by means of an external push rod 74 axially guided to be slidable at right angles to the axis of the additional prong 76. The push rod 74 temporarily disengages the pawl 72 from the ratchet tooth 70.

The socket 73 is secured to ceiling 16 by means of screws 75.



Referring now to FIG. 5, there is depicted a plug 78 supporting wherein the appliance, which is an electric light fitting 80. The socket 82 is installed in a wall 84.

5 The scope of the described invention is intended to include all embodiments coming within the meaning of the following claims. The foregoing examples illustrate useful forms of the invention, but are not to be considered as limiting its scope, as those skilled in the art will readily be aware that additional variants and modifications of the invention can be formulated without departing from the meaning of the following claims.

## CLAIMS

1. A socket and plug combination for conducting electric power and for  
5 mechanically supporting an appliance receiving said power, said combination comprising:

- a) a socket rigidly attachable to a wall or ceiling, said socket including at least two spaced-apart hollow receptacles connectable to an electric power supply, said socket also comprising a mechanical connection first element;
- 10 b) a plug rigidly attachable to and configured to mechanically support an appliance, said plug supporting at least two projecting prongs engageable with said two hollow receptacles and connectable to conductors for feeding electric power to said appliance, and said plug also comprising a mechanical connection second element engageable with said first element; and
- 15 c) releasable latching means attached to said combination providing the retention force between said socket and said plug to support said appliance.

2. The socket and plug combination as claimed in claim 1, wherein said mechanical connection first element comprises a rim of said socket, said  
20 mechanical connection second element comprises a rim of said plug, and said releasable latching means comprises a releasable catch tongue springing into engagement when the said plug is pushed into said socket.

3. The socket and plug combination as claimed in claim 1, wherein said  
25 mechanical connection first element comprises an additional receptacle and said mechanical connection second element comprises an additional prong engageable with said additional receptacle.

4. The socket and plug combination as claimed in claim 3, wherein said  
30 releasable latching means is a captive ball detent.

5. The socket and plug combination as claimed in claim 3, wherein said releasable latching means is a safety pin.

6 The socket and plug combination as claimed in claim 3 wherein said  
5 releasable latching means is a ratchet tooth and pawl.

7. The socket and plug combination as claimed in claim 3, wherein said latching means is releasable by means of an external push rod axially guided to be slidable at right angles to the axis of said additional prong.  
10

8. The socket and plug combination as claimed in claim 3, wherein said additional prong and additional receptacle are metallic and are arranged to be wired for use as an earth connection.

15 9. The socket and plug combination as claimed in claim 1, wherein said latching means engages said additional receptacle with sufficient retention force to support a two kg appliance in a ceiling socket during an earthquake not causing structural damage to the building in which said combination is installed.

20 10. The socket and plug combination as claimed in claim 1, wherein the geometrical size, shape and formation of said two hollow receptacles conforms to that of an existing standard electric socket.

11. The socket and plug combination as claimed in claim 1, wherein said  
25 appliance is an electric light fitting.

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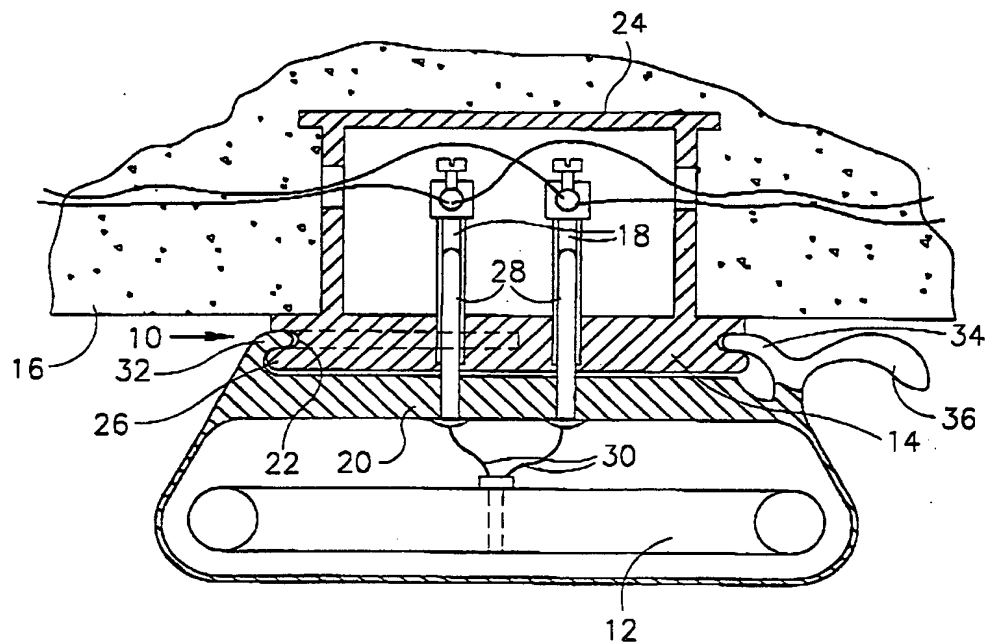


FIG.1

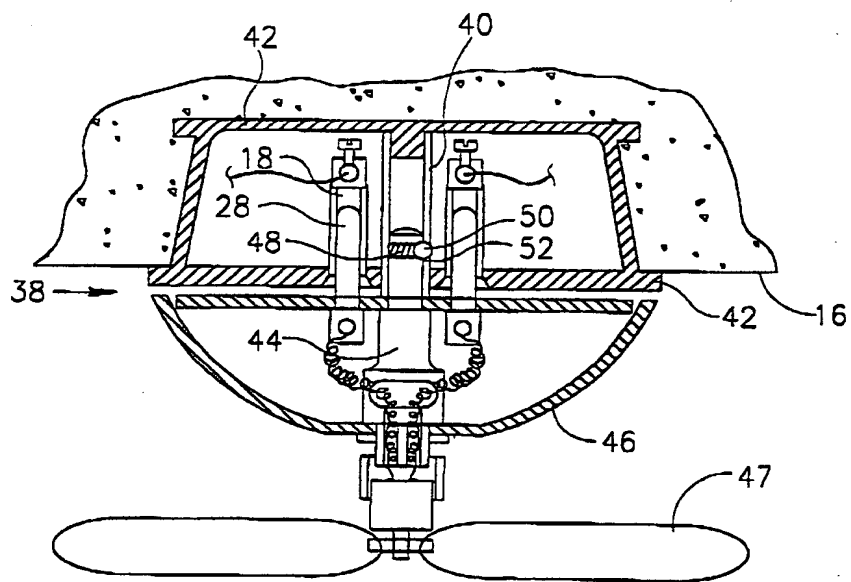


FIG.2

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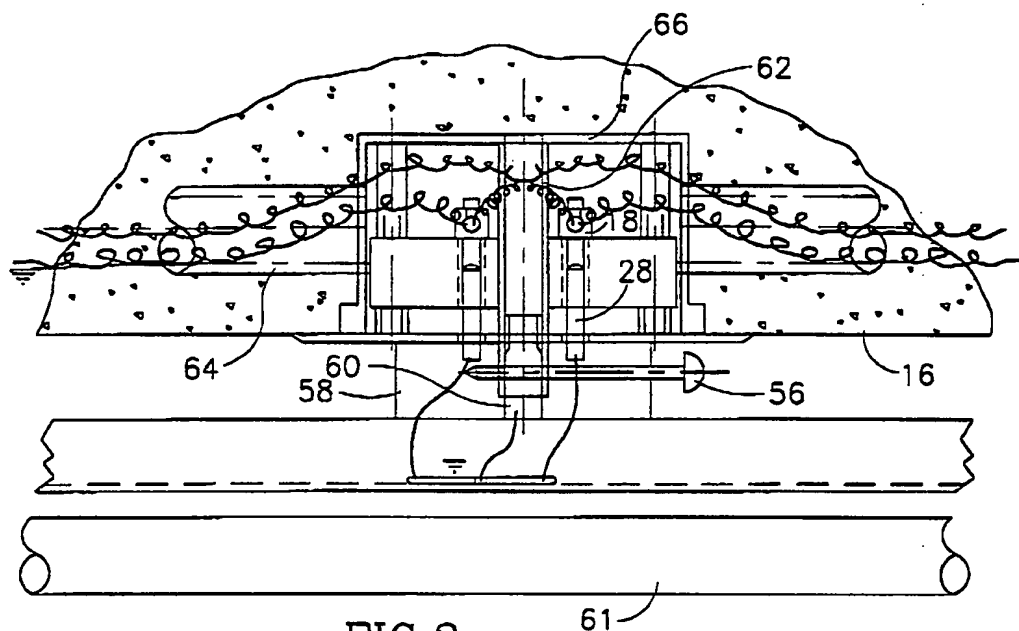


FIG. 3

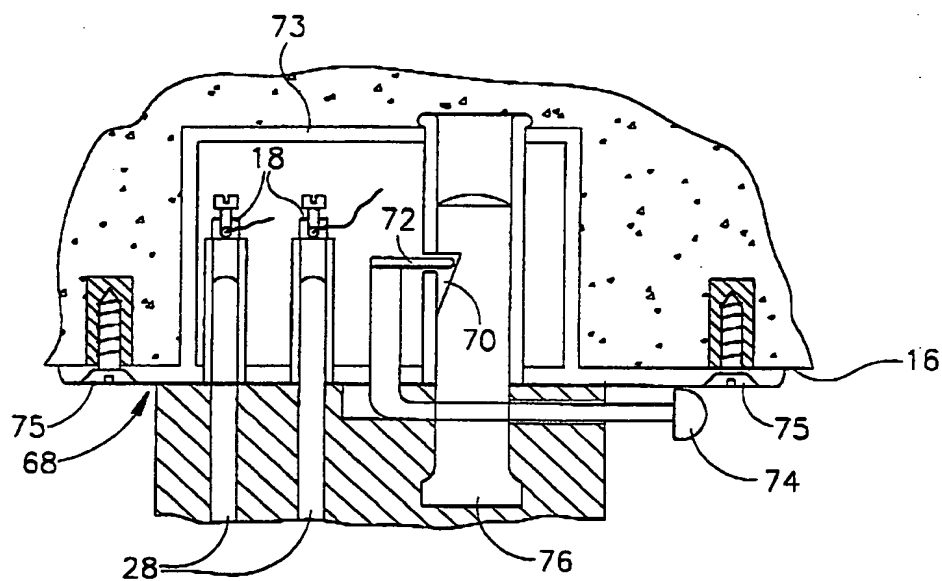


FIG. 4

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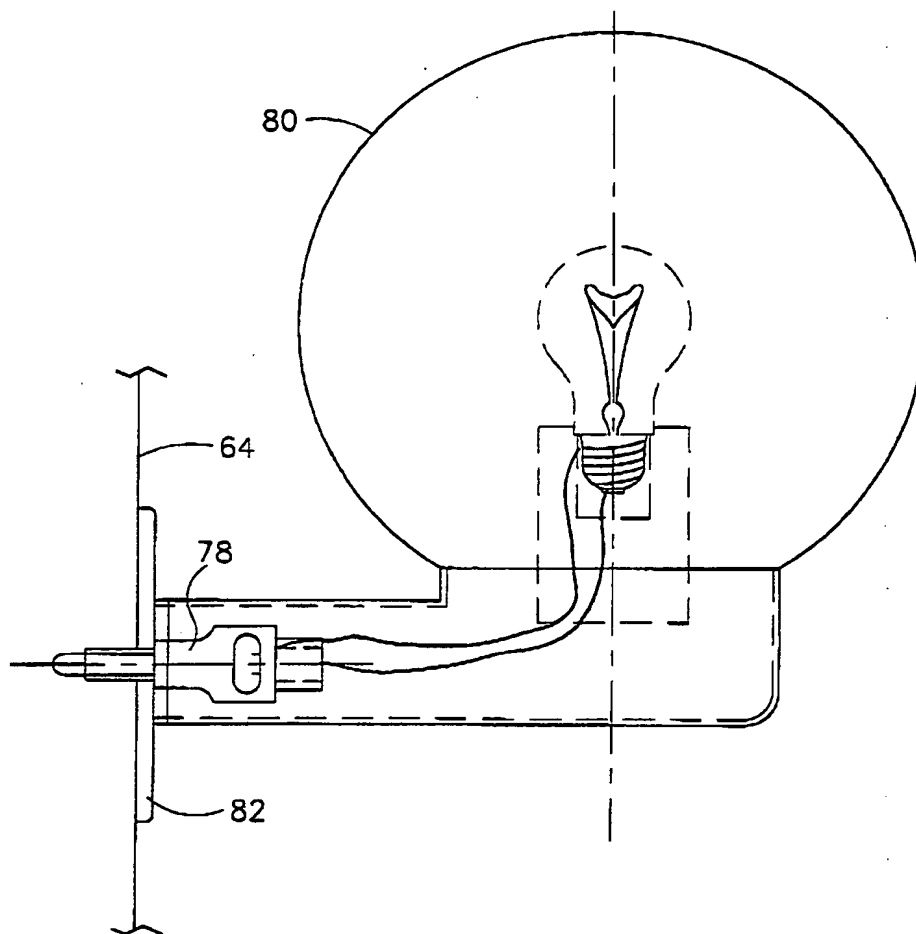


FIG. 5